REMARKS

Specification

In the Office Action the Examiner objected to informalities in the Specification and to lack of proper indications to Fig. 1a, 1b, etc. The amendments above are believed to have cured the lack of proper indications. Applicants respectfully disagree with the Examiner's comments regarding "foot notes." The additional references are provided for the convenience of those reproducing or extending the Applicants' results. Since some of the references are cited more than one time, Applicants believe that incorporating the references directly into the text would significantly increase the length of the printed patent while, at the same time, significantly decrease the readability without providing any significant benefit. Applicants request that the Examiner and her Supervisor consider the advantages of using this approach to references. The environmental savings in paper alone should militate towards this approach. If, however, it is determined that the USPTO has a firm policy against this type of citation, Applicants will, of course, submit the requested amendments with their reply to the next Office Action.

Drawings

The Examiner objected to the apparent lack of proper labeling of the drawings. In the originally submitted drawings the panels were "1a", "1b", etc. In addition, the original drawings contained micrometer markers to allow judgment concerning dimensions of the structures. However, it appears that the photocopies provided to the Examiner did not show these markings. The problem appears to be that the markings in question are "black" and in the copies these marking were obscured. Appended hereto are reprinted drawings (low resolution) so that the

Examiner can discern the markings. Applicants would like the Examiner's approval to use these marking but invert them into white characters against the darker photographs. Unfortunately, the artists have not yet produced the modified white markings. If the Examiner approves the concept, figures using white markings (that is "a". "b" and "micrometers" as white characters).

Claim Rejections under 35 U.S.C. §112, second paragraph

The Examiner rejected claims 13-16, 29-32 and 41-43 under 35 U.S.C. §112, second paragraph. Applicants believe that the claim amendments made above have corrected these claim problems. Applicants respectfully request the rejections under 35 U.S.C. §112, second paragraph.

Claim Rejections under 35 U.S.C. §102

The Examiner has rejected claims 1-3, 7, 8, 11, 12, 18-20, 24, 25, 28, 34, 37, and 40 under 35 U.S.C. §102(b) as being anticipated by **Morgan et al.** (US Patent No. 5,665, 463). The Examiner's point is that this reference teaches a ceramic composite with a bonded interface between the constituents of the ceramic composite (the bond material being chosen from monazites and xenotimes).

Applicants' invention is a thermal barrier. As explained in the Background section of the Specification, thermal barriers are relatively thick (more often 100-200 μm or more depending on the thermal conductivity of the barrier material) exterior coatings of a material with a low thermal conductivity (see paragraph beginning at line 2 of page 2) intended to protect a coated substrate from heat damage. Thermal conductivity of usable barrier materials is in general less than about 2 W/mK which is similar to the conductivity of zirconia—a commonly used

thermal barrier material (see page 9, line 15). The thermal conductivity and other critical characteristics can be favorably modified by altering the porosity and crystal structure of the coating. In theory, the thicker the coating, the better the thermal barrier. However, the thicker the coating, the more likely that the layer will be lost due to spalling. In addition, traditional barrier layer materials are prone to breakdown through corrosion, etc. The present invention uses monazites and xenotimes to create barrier layers that resist the usual causes of failure.

In terms of **Morgan et al.** Applicants point out that the reference teaches nothing concerning thermal barrier coatings. Rather it teaches a ceramic composite with xenotime or monazite interfaces between the constituents of the composite. Such a structure would not provide the thermal resistance of an effective thermal barrier coating. The present invention teaches how to make monazite or xenotime thermal barriers in which are relatively thick layers with the thermally non-conductive material throughout as opposed to the composites of **Morgan et al.** where the rare earth material is largely present at interfaces.

In terms of the Examiners comments regarding the 1:1 stoichiometric mature of the materials—for example, in reference to claim 3—Applicants agree that it is well known from the literature that these compounds had this characteristic. Therefore, in the case of the claim where the ratio is about 1:1 any excess of either the rare earth or the phosphorous must exist in a second phase.

In terms of the rejections under 35 U.S.C. §102(b) based on **Glassman et al.** (US Pat. No. 5,698,022) Applicants point out that this reference provides a method for making lanthanide/phosphorous *thin films* and interface coating for composites of the type disclosed by **Morgan et al.** A reading of the reference shows that the "substrate" that is coated is a filament or multifilament fiber tow

used in making a composite. There is no teaching of a relatively thick unreinforced layer having sufficient thermal insulation properties. Prior to the present invention it was not known that layers having these properties could be formed from monazites and xenotimes.

In terms of the claim rejections made under 35 U.S.C. §102(b) based on **Hunt et al.** (US Pat. No. 5,858,465) Applicants point out that **Hunt et al.** disclose metal phosphate films containing essentially any type of metal. These films are either thin coatings used for corrosion resistance or interface films used with composites of the **Morgan et al.** type. As pointed out above composites are not the unreinforced layers with thermally non-conductive material throughout contemplated in the present thermal barrier invention. In addition, thin layers (generally less than 10 μm; see column 1 at line 34; column 10, line 27 et seq.) cannot have the thermal barrier properties required in the present invention. Further, while rare earth phosphates have the required thermal conductivity properties, **Hunt et al.** does not differentiate between rare earth and other phosphates (see paragraph starting at column 7, line 56). Thus this reference teaches how to make thin films, some of which are of similar materials to the present invention, but none of which are non-composite thick films of the present invention.

The claims have been amended to clarify the characteristics of the present invention that distinguishes it from the cited art. Because none of the cited prior art now teaches each and every element of the present invention as claimed, Applicants respectfully request the Examiner to withdraw the claim rejections made under 35 U.S.C. §102(b).

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner has any questions or still finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number listed below to discuss the steps necessary for placing the application in condition for allowance.

You are hereby authorized to charge any fees due and refund any surplus fees to our Deposit Account No. 50-2567.

Respectfully submitted,

REED SMITH CROSBY HEAFEY

Date: 3 July 2003

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